

REMARKS/DISCUSSION OF ISSUES

By this Amendment, Applicants cancel the previously-withdrawn claims 1 and 5-9, and also cancels claim 11 – all without prejudice against subsequent presentation and prosecution, and without disclaimer of the underlying subject matter. Applicants also add new claims 23-30.

Accordingly, claims 10 and 12-30 are pending in the application.

Reexamination and reconsideration are respectfully requested in view of the following Remarks.

35 U.S.C. § 103

The Office Action rejects the pending claims 10 and 11-22 under 35 U.S.C. § 103 over Sakurai U.S. Patent 4,965,532 (“Sakurai I”) in view of Sakurai et al. U.S. Patent 6,569,100 (“Sakurai II”).

Applicants respectfully traverse those rejections for at least all of the following reasons.

Claim 10

Among other things, the starting-process controller includes an adjustable time-delay element.

Applicants respectfully submit that the cited art, and in particular Sakurai I, does not include the adjustable time-delay element of claim 10.

The Office Action cites “item 12” as supposedly corresponding to the adjustable time-delay element of claim 10.

Applicants respectfully disagree.

“Item 12” in Sakurai I is a phase lock loop (PLL) that consists of VCO 17, loop filter 16, and phase comparator 15.¹

PLL 12 is not an “adjustable time delay element.”

PLL 12 does not time-delay any signal.

¹ Applicants also respectfully note that elements 17, 16 and 15 have already been cited as corresponding to the separately recited elements of claim 10: the VCO, loop filter, and phase comparator, and therefore cannot correspond to the separately-recited adjustable time-delay element.

Furthermore, PLL 12 does not *"provide for controlled reduction of the phase difference between the motor voltage and the motor current in a start-up process for starting up the piezomotor from a large starting angle at initiation of the start-up process towards a smaller operating angle at an operating point,"* as recited in claim 10.

Indeed, **nothing** in the cited FIG. 3 of Sakurai I provides for controlled reduction of the phase difference between the motor voltage and the motor current in a start-up process for starting up the piezomotor from a large starting angle at initiation of the start-up process towards a smaller operating angle at an operating point. This is quite obvious from a simple inspection of FIGs. 8A-D of Sakurai I, which clearly show that the phase difference $\Delta\theta$ cycles periodically between both positive and negative values during initial start-up.

Indeed, FIG. 3 of Sakurai I is not concerned in the least bit with reducing the phase difference between the motor voltage and the motor current in a start-up process for starting up the piezomotor. Instead, FIG. 3 of Sakurai I is only concerned with locking the PLL **frequency** to the resonant frequency of ultrasonic vibrating element 11 using resonant point detector 22 (while preventing the PLL from locking onto an anti-resonant frequency, such as f_1 or f_2 as shown in FIG. 8D – which is why the impedance signal is also provided to resonant point detector 22). Indeed, Sakurai I very clearly teaches that the reference signal generating circuit 18 should be employed until the phase difference between the voltage and the current applied to vibrating element 11 is **zero** (!) - which according to Sakurai I, indicates that the resonant frequency point has been achieved.

In summary, neither PLL12 nor anything else in FIG. 3 of Sakurai I provides for controlled reduction of a phase difference between a motor voltage and a motor current in a start-up process for starting up the piezomotor from a large starting angle at initiation of the start-up process towards a smaller operating angle at an operating point.

Therefore, FIG. 3 does not, and cannot, include the adjustable time-delay element of claim 10.

Furthermore, as noted above and as is clear from inspection of FIG. 8D of Sakurai I, nothing in FIG. 3 of Sakurai I effects a reduction of the phase difference between the motor voltage and the motor current from a large starting angle at initiation of the start-up process towards a smaller operating angle at an operating point, either in the form of: (1) a preset linear gradient; (2) a preset progressive curve where, as the operating point is neared, the change in delay per selected time increment becomes progressively smaller; or (3) a combination of (1) and (2).

Finally, for the record, Applicants respectfully continue to traverse the proposed combination of Sakurai I and Sakurai II for the reasons stated in previously-filed Amendments, and further because the cited elements of the two references – one pertaining to a VCO PLL, and the other to a direct digital synthesizer (DDS) circuit – are not combinable either physically, or logically.

Accordingly, for at least these reasons, Applicants respectfully submit that claim 10 is patentable over the cited art.

Claims 11-22

Claims 11-22 depend from claim 10 and are deemed patentable for at least the reasons set forth above with respect to claim 10. Applicants also respectfully submit that several of the features specifically recited in the depending claims, notable claims 14, 16, 17 and 20 in particular, are clearly missing from the cited references.

NEW CLAIMS 23-30

New claims 23-26 depend from claim 10, and are deemed patentable over the cited art for at least the reasons set forth above with respect to claim 10, and for the following additional reasons.

Claim 23

Among other things, in the starting-process controller of claim 23, an output of the adjustable time-delay element is directly connected to an input of the phase comparator. Very clearly no such feature is disclosed in the cited art. For example, the Office Action cites PLL12 as supposedly corresponding to the adjustable time-

delay element of claim 10, and (incongruously) cites phase comparator 15 as supposedly corresponding to the phase comparator of claim 10. Very clearly, no output of PLL12 is directly connected to any input of comparator 15.

Claim 24

Among other things, in the starting-process controller of claim 24, the adjustable time-delay element delays only one of the motor voltage and the motor current, and provides the delayed one of the motor voltage and the motor current to the input of the phase comparator. Very clearly no such feature is disclosed in the cited art. For example, the Office Action cites PLL12 as supposedly corresponding to the adjustable time-delay element of claim 10, and (incongruously) cites phase comparator 15 as supposedly corresponding to the phase comparator of claim 10. Very clearly, PLL12 does not delay only one of the motor voltage and the motor current, and furthermore it does not provide any delayed motor voltage or motor current to the input of comparator 15.

Claim 25

Among other things, in the starting-process controller of claim 25, the adjustable time-delay element includes a binary counter whose output is provided to the input of the phase comparator. No combination of the cited art would include such a feature.

Claims 26-30

Among other things, the starting-process controllers of claims 26-30 all include an adjustable time-delay element adapted receive the motor current and to delay the motor current by a delay amount, and a phase comparator adapted to receive the motor voltage and the delayed motor current from the adjustable time-delay element, and to output a phase-difference signal representing a measure of a phase difference between the delayed motor current and the motor voltage.

No combination of the cited art include3s such a combination of features.


Applicants also note that numerous other features of claims 27-30 are also missing from the cited art, but Applicants are not required to point out all of the numerous reasons that these claims are deemed patentable over the cited art.

CONCLUSION

In view of the foregoing explanations, Applicants respectfully request that the Examiner reconsider and reexamine the present application, allow claims 10 and 12-30, and pass the application to issue. In the event that there are any outstanding matters remaining in the present application, the Examiner is invited to contact Kenneth D. Springer (Reg. No. 39,843) at (571) 283.0720 to discuss these matters.

Respectfully submitted,

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